"Buffalo" Conoidal Fans

Catalog No. 422

Buffalo Conoidal Ventilating Fans

~~Duplex~~ and ~~Turbo~~

Catalog No. 422

Buffalo Forge Company

Buffalo, New York

Engineering Offices in All Principal Cities

In Canada:

Canadian Blower & Forge Company, Ltd.

Kitchener, Ontario

Foreword

IN presenting this catolog to our good friends, we have been guided by their many requests for a book which would show the distinctive advantages of Buffalo Conoidal Fans. This book is intended to present, in brief form, the advantages in design and characteristics of Buffalo double-curved blade fans, as well as information on the application of these fans to heating and ventilating service. It does not give engineering data suitable to assist in the selection of a fan for a given service, as this information is contained in our Catalog No. 426.

The advice of our Engineering Department is at your disposal. We urge you to use this service.

BUFFALO FORGE COMPANY

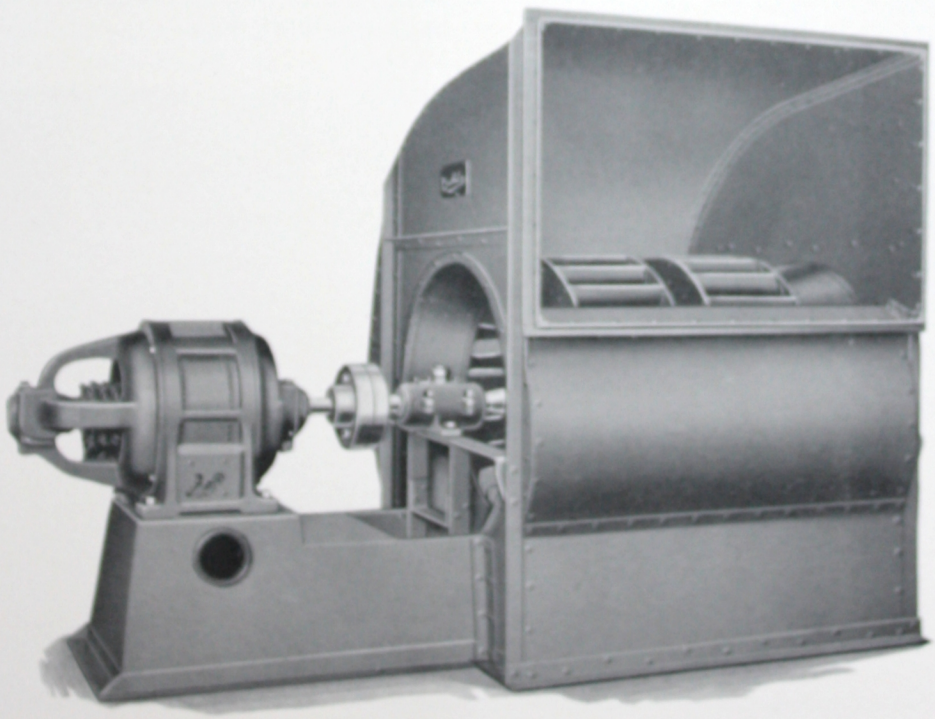
Modern Multiblade Fans

THE Duplex and ~~Turbo~~ Conoidal fans have been developed to fill an ever increasing need for fans having higher speeds than the older type with forward-curved blades. In order to obtain the advantages of direct drive to electric motor a higher speed fan was necessary and these newer fans with double-curved blades are the result.

To-day the advantages of direct driven fans are unquestioned where the service will permit such an arrangement. The expense and trouble of belts or other gearing are eliminated and also a valuable saving in floor space and foundations is effected. Direct driven fans spell less erection and maintenance worries and therefore deserve your consideration.

The modern ventilating fan must be quiet and vibrationless. The Duplex fan will fully satisfy you in these respects. Operating at speeds 15 to 20 per cent. higher than the older forward-curved blade fans, this new fan with double-curved blades is appreciably quieter and requires less power to operate.

In addition to these advantages the new double-curved blade fans offer improved operating characteristics such as flatter horsepower curve with less danger of overloading and stable pressure curve.

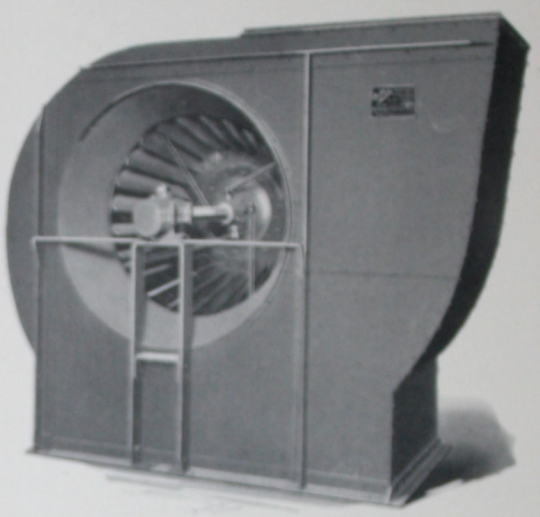


Double-width Fan, Top Horizontal Discharge

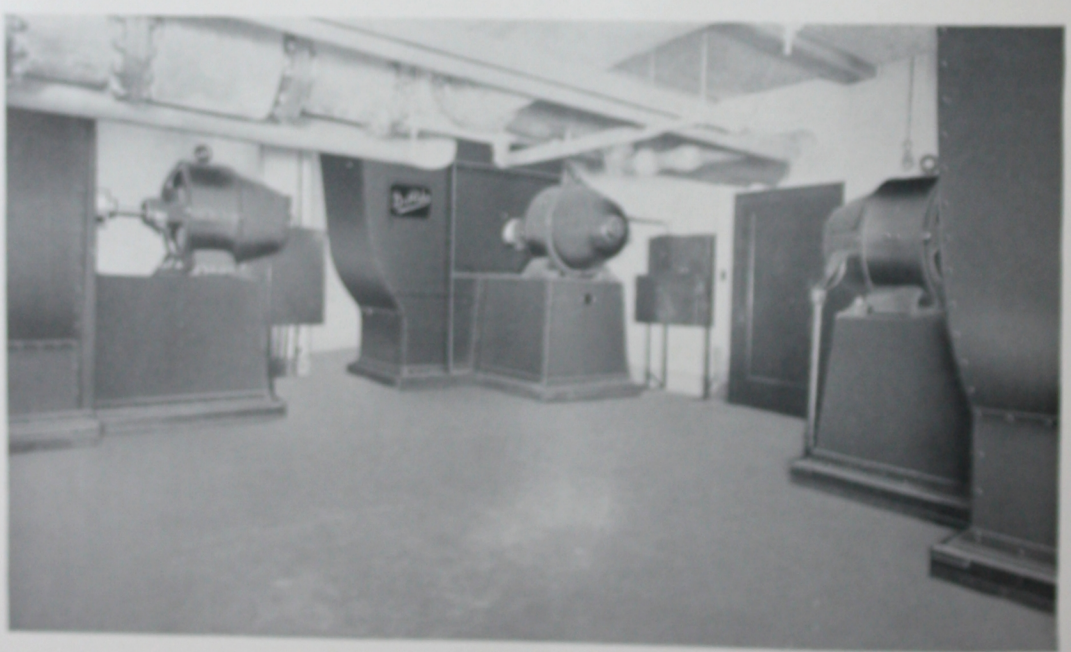
Housing Design

Housings for multiblade fans should be given as much consideration as the design of fan wheel itself. A good wheel can be ruined as far as efficiency, noise and desirable characteristics are concerned, by a poor housing, and vice versa. Double-curved blade fans operate in housings scientifically designed to give maximum efficiencies. The velocity of air through scroll and outlet is maintained low, thereby keeping down fan noise to a minimum.

The general arrangement of the scroll is such as to gradually reduce the velocity of air leaving the wheel as the air approaches the fan outlet. This is in accordance with the theory of the free vortex and produces a greater conversion into static pressure at the fan outlet than if the velocity of air were reduced suddenly. The area in the fan housing at the point of cut-off is approximately 95 per cent. of the actual outlet opening. This feature of housing design was originated by the Buffalo Forge Company and has been consistently used on all of its multiblade fans.



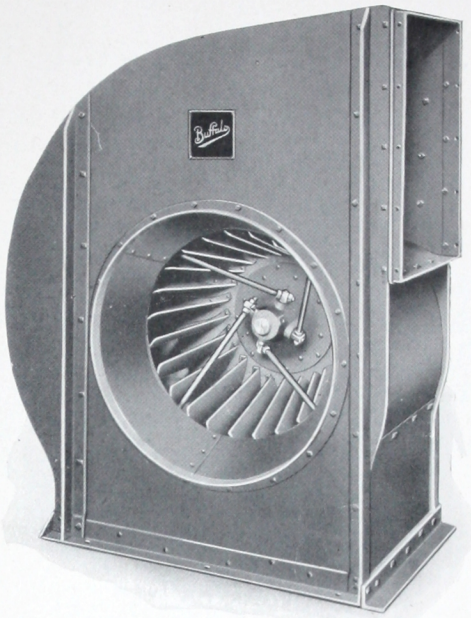
Clockwise Up Discharge Fan
Showing Arrangement No. 3



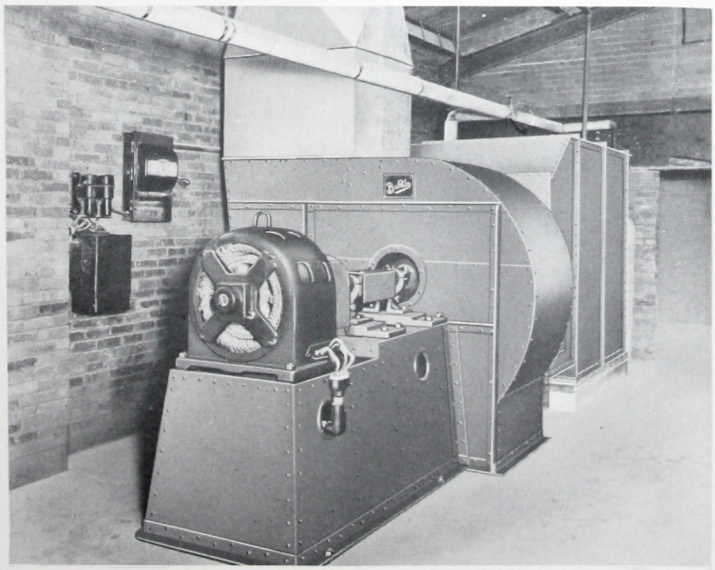
Ventilating Fans in Illinois Merchants Bank, Chicago

In many of the fans now on the market, more particularly the forward-curved blade type of fan, the area of housing at the point of cut-off is as small as 60 per cent. of the actual outlet opening. This produces a restricted air passage, and means a high velocity of air at this point accompanied by undesirable noise. It has been conclusively demonstrated that ~~Duplex~~ Conoidal fans operating at the same capacities and pressures are considerably more quiet than these older types, due to the lower velocity of air at point of cut-off, even though operating at 20 to 30 per cent. higher tip speeds.

Moreover, it is a well known fact that where there is a sudden enlargement between point of cut-off and fan outlet a straight run of duct is required to effect any satisfactory conversion from velocity into static pressure. In such cases elbows cannot be placed near to the fan outlet without seriously reducing this conversion and consequently the capacity of the fan. Since the outlets of the ~~Duplex~~ and ~~Turbo~~ Conoidal housings are 100 per cent. effective (the conversion having been accomplished in the scroll itself) the static pressure of the fan as so rated is available at the outlet regardless of the duct system to be attached. This is an important item, though frequently overlooked on ventilating layouts, where it often becomes necessary to branch or elbow the duct work immediately at fan outlet.



Counter Clockwise, Top Horizontal Fan
Showing Arrangement No. 4



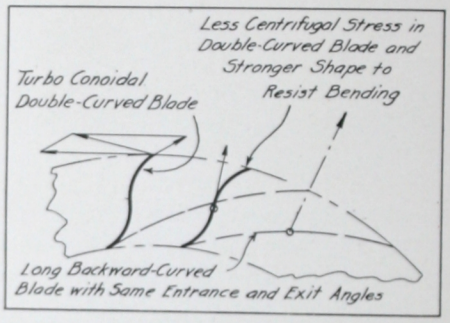
Fan and Heater Installation in an Industrial Plant

Double-Curved Blades

In order to pick up the air at the heel or inner edge of the blade, the blade should be inclined forward to meet the air with the least possible loss by shock. Likewise for fans operating at motor speeds, the tip or outer edge of the blade should be inclined backward, away from the direction of rotation. Obviously there are two types of blade construction that will fulfill these requirements; the one is the long backward curved blade which is structurally very weak, while the other is the shorter, more erect blade with the double curvature.

This is clearly illustrated in the accompanying sketch. It will be evident that the inlet and exit angles of the two forms will be alike respectively. These two fundamental differences, however, exist: the double-curved blade is shorter and will produce a lighter weight wheel; at the same time the blade lies more nearly in a radial plane and therefore is also considerably stronger to withstand the centrifugal stresses. The net air space between any two blades will be greater and therefore a larger capacity fan will be the result.

The ~~Duplex~~ and ~~Turbo~~ Conoidal fans are scientific applications of this double-curve principle. At once it will be seen that it is unnecessary to load the wheels down with extra weight which can serve no



useful purpose. Extra heavy wheels mean extra heavy shafts and higher bearing pressures. On the other hand, double-curved blade fans of the same gauge material are obviously just as durable, yet lighter and considerably stronger, due to the more equable distribution of weight.

Partial View of Duplex Conoidal Fan Wheel

Partial View of Turbo Conoidal Fan Wheel

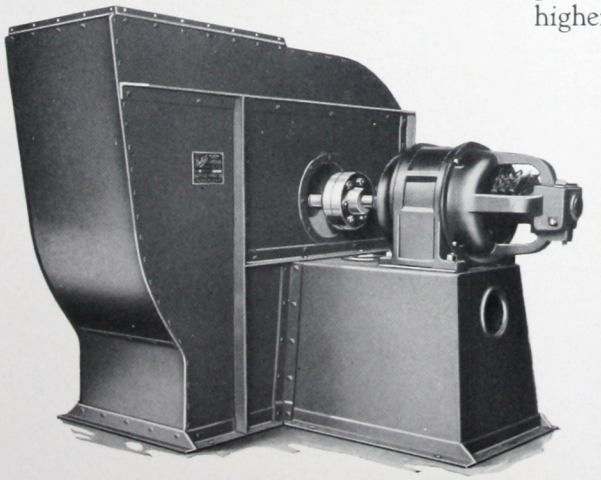
Buffalo ~~Turbo~~ Fans

This was the first double-curved blade fan to be offered to the public. In its 14 years of existence it has faithfully served in both the low- and high-pressure field. Fundamentally the same, but constantly improved, this fan stands today the most efficient multiblade fan on the market.

The ~~Turbo~~ Conoidal fan is a high-speed type of fan operating at speeds 60 to 80 per cent. faster than the older type of forward-curved multiblade fan for the same air and pressure. The tip of the blade has a full backward slope, producing a steep pressure curve and a moderately flat horsepower curve. These characteristics give the fan special applications where exact operating conditions are not definitely known or where the operation requires a variable performance. Although considered by some a too high-speed fan for ventilating work, many very satisfactory installations have been made which absolutely disprove this view.

When constructed of the heavier gauges, the ~~Turbo~~ Conoidal fan is well suited for high-speed, high-pressure work and finds a special application for forced draft under boilers and other similar industrial uses. Due to the variable resistance of the fuel bed in stokers, the steep pressure curve of this fan provides for a minimum change of capacity to suit these variations. The stiff blade form and rigid wheel construction permit of assured operation at these higher speeds.

Turbo Conoidal Fan Wheel

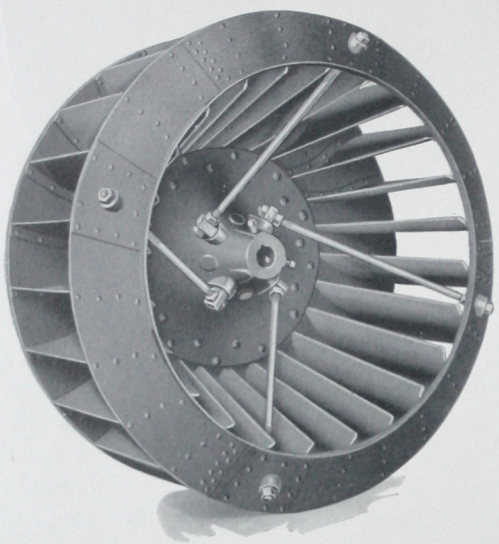


Clockwise Up Discharge Fan
Showing Arrangement No. 6

When equipped with inlet guards, the pressure curve becomes steeper and a self-limiting horsepower characteristic is obtained. In such cases the speed of operation determines the size motor to be used without any necessary provision for overload, since this cannot take place. Thus there is a material saving effected in the initial cost of motors, as well as a lower maintenance cost due to their operation at a more efficient point. These items are real and cannot be economically overlooked.

Buffalo ~~Duplex~~ Fans

This fan is a more recent application of the double-curve principle. It is a moderate-speed type operating at speeds 15 to 20 per cent. higher than the forward-curved blade fan and is suitable for direct connection to the lower speed electric motors. Originally developed as a fan for heating and ventilating purposes, it quickly gained recognition in this field from leading architects and engineers.



Duplex Conoidal Fan Wheel

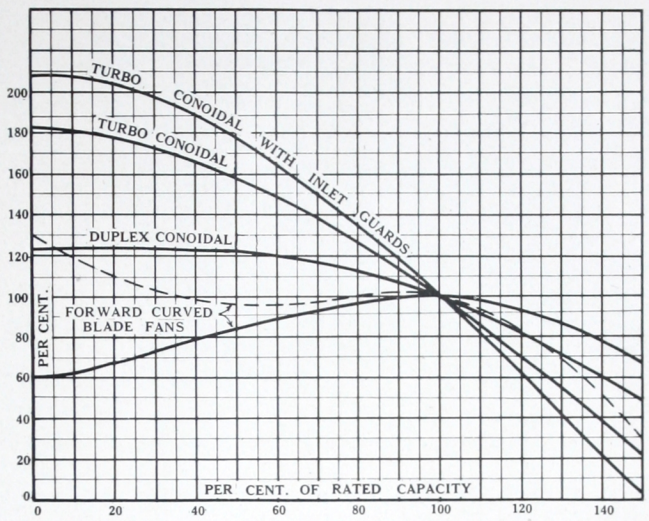
The inlet edge of the ~~Duplex~~ fan blade is curved forward to meet the air with a minimum shock loss while the tip has a slightly backward curvature. This produces a rigid blade form due to the reversal of curvature and offers a rugged wheel construction strengthened by a tangent setting of the tie rods. When placed in a housing having low velocities throughout, the ~~Duplex~~ is an exceptionally quiet fan.

It is commonly known that two very good features of the old radial blade fan were not possible to attain in a fan of the forward-curved blade type. These were a rising pressure characteristic and a flatter horsepower curve. Modern double-curved blade fans reclaim these valuable features. With a continuously rising pressure characteristic this fan gives ideal parallel operation and for the same reason finds favor in the double-width style housing where head-room may be limited. Large oversized motors are not required since a moderately flat horsepower curve makes this unnecessary.

When constructed of the heavier gauge material and operated at the higher speeds this fan is especially suited to forced and induced draft service. Where the ~~Turbo~~ is usually selected for the forced draft end of the furnace, the ~~Duplex~~ cares for the induced draft requirement. The heavy duty placed upon an induced draft fan cannot be questioned, for here we have not only large quantities of air to be moved at high pressures but the fan is also subjected to the high temperature of the gases. Besides, extra long shafts must be used if the bearings are to be placed at accessible points outside of the inlet boxes and away from the hot gases. In such cases the lighter, though stronger wheel, lessens the shaft stresses and the danger from a dirty, unbalanced wheel. Many forced and induced draft fans are to be found in the power houses of the leading industrial and power companies of the country. That they are performing efficient, safe and constant service is attested by the large percentage of repeat orders from these companies. That they can and are giving equally satisfactory service in the lower pressure field is obvious.

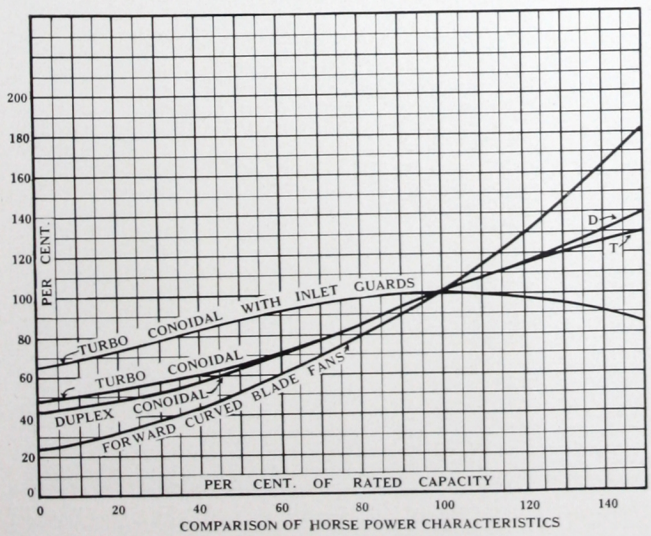
~~Turbo~~ and ~~Duplex~~ Fan Characteristics

Both types of double-curved blade fans have a continuously rising pressure characteristic from free-delivery to no-delivery conditions. This means a stable fan—one that will not allow a large capacity variation for a slight change in pressure. A glance at the accompanying curves will make this evident.



COMPARISON OF PRESSURE CHARACTERISTICS.

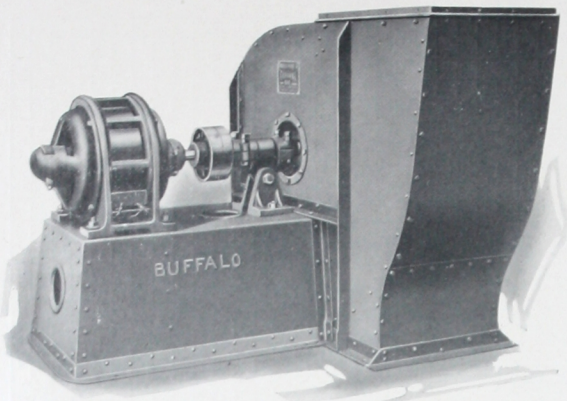
Assume a condition where a forward-curved blade fan is operating at 100 per cent. rating and let this correspond to $1\frac{1}{4}$" static pressure. If this pressure should fall to $\frac{3}{4}$" it may be seen that for this drop in pressure (40 per cent.) the capacity will increase 55 per cent. and the horsepower rise 90 per cent. This means an excessively large motor must be provided to care for such a variation in pressure which is not unreasonable to expect on some installations. On the other hand a ~~Duplex~~ fan will show a 40 per cent. increase in capacity for the same conditions but only a 30 per cent. rise in horsepower. If a ~~Turbo~~ were selected on the above basis, the capacity would increase 20 per cent. and power only 15 per cent. above normal. These percentages would be even less if inlet guards were used. This means that not only can a smaller motor be selected to care safely for the overload, but also the smaller motor will be using less current for the normal load.



COMPARISON OF HORSE POWER CHARACTERISTICS

Where the exact conditions under which a fan is to operate are not known and may assume such proportions as indicated above, it has been the custom to specify larger motors than necessary in order to care for just such an emergency. Architects and engineers are not to be blamed for this condition, as they know that only too often the equipment is not installed as intended and frequently cannot be so erected when the time arrives.

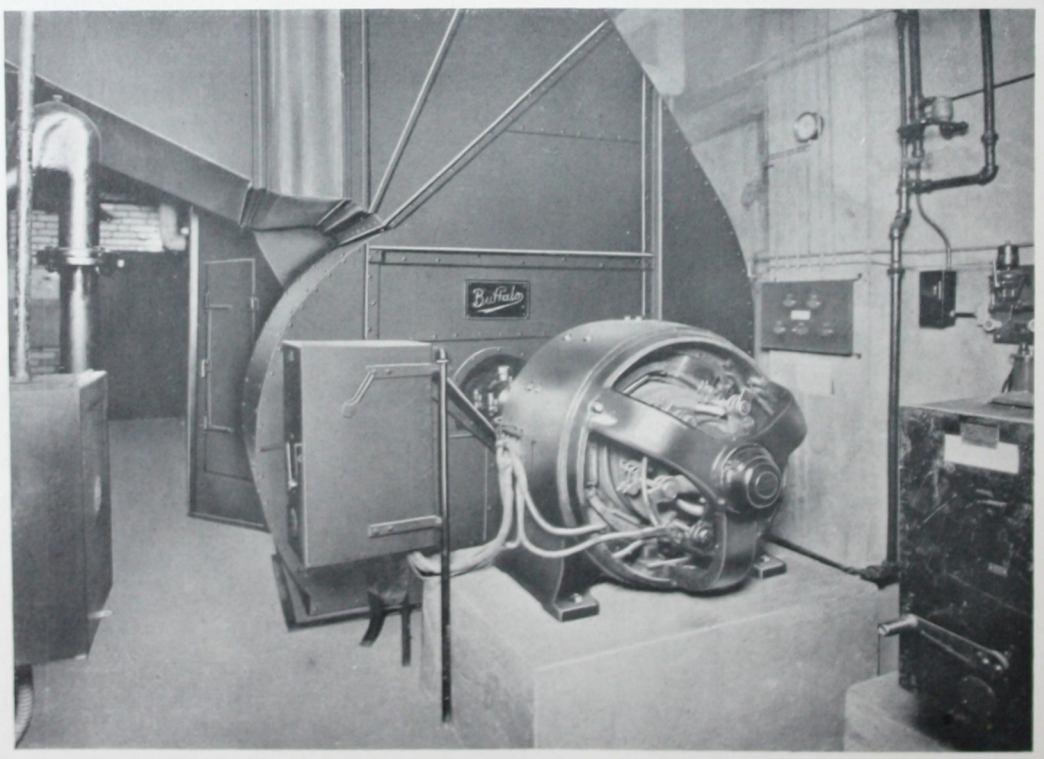
Fan Characteristics (Continued)



Counter Clockwise Up Discharge Fan
Showing Arrangement No. 5

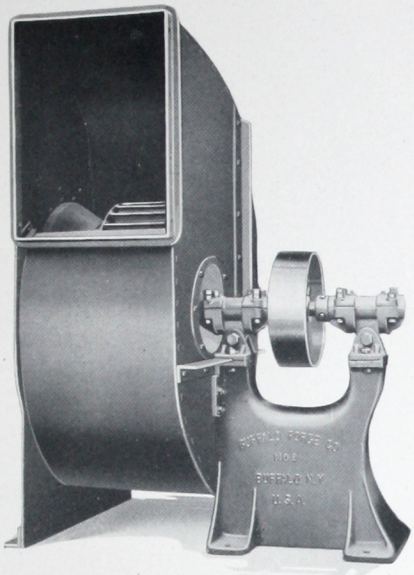
The answer to this is the fan with the double-curved blade, which operates more nearly at the point intended and greatly reduces the margin required for unforeseen and altered conditions.

Moreover, double-curved blade fans will always give satisfactory parallel operation. This was one disappointment with the forward-curved blade fan. For, owing to the rise and fall in the pressure curve, two capacities were possible for certain pressures. Thus when two fans were blowing into the same duct or, which is the same, a double-width fan was used, there was always the danger that they would become unbalanced, one fan taking the light load and the other the heavy load. In neither case would the fan be operating at its most efficient point. This cannot happen with either a Duplex or Turbo Conoidal fan for, owing to the continuously rising pressure curve, each fan must take its share of the load. Double-curved blade fans should therefore be selected for double-width service or parallel operation.



Ventilating Fans in Mayfair Hotel, St. Louis

Outlet Velocity—Tip Speed



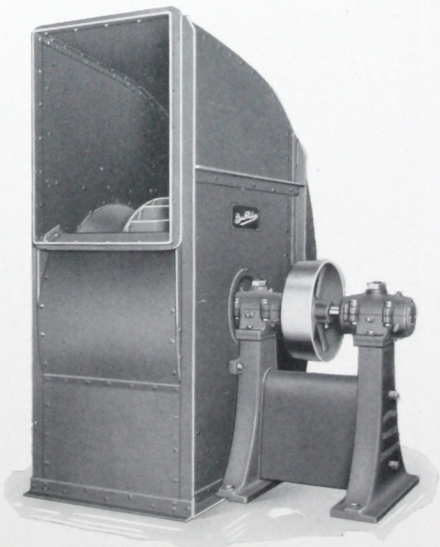
Overhung Wheel Type—Sizes 3–6
Arrangement No. 1

Heating and ventilating requires a smooth, quiet-running fan. The problem of noise in a fan is one of air velocities entirely—assuming, of course, that the fan is mechanically balanced and sufficiently well constructed. As for noise, the housing and duct serve only to amplify the vibrations imparted to them.

For a given capacity and pressure the absolute velocity of the air at the tip of a forward-curved blade fan is higher than that in a fan such as the ~~Duplex~~. This, in itself, would have no significance if this air did not impinge upon the fan cut-off. With a much smaller area at cut-off this impinging of air at higher velocity makes the forward curved blade fan more noisy than the ~~Duplex~~, even though the rotative speed of the latter be 20 to 30 per cent. higher.

Moreover, it is evident that since the blades of the wheel do not touch the cut-off piece itself, the noise from this source must come from the intervening air. Now since the ~~Duplex~~ and ~~Turbo~~ fans have 24 blades each instead of 60 to 64, as in the case of the shallow, forward-curved type, there will be only 60 to 75 per cent. of the impulses at this point and at a lower absolute velocity, even though the rotative and tip speeds are somewhat higher. You will readily see that tip speed has no argument when considered alone.

If it is desired to limit noise we recommend the following schedule of maximum velocities to use at the point of cut-off which in the ~~Duplex~~ and ~~Turbo~~ fans is 95 per cent. of the actual outlet area: for ~~Duplex~~ supply fans 2000 feet per minute for schools, auditoriums, etc., and 2200 feet per minute for hotels and public buildings where a slight noise may not be objectionable; for ~~Duplex~~ exhaust fans discharging out-of-doors, 2200 for schools, auditoriums, etc., and 2400 for hotels and public buildings. For ~~Turbo~~ Conoidal fans the absolute velocity of air leaving the blades will be slightly lower, but the rate of blade impulses considerable higher, for which reasons we recommend velocities 200 to 400 feet per minute lower than given above for ~~Duplex~~ fans.

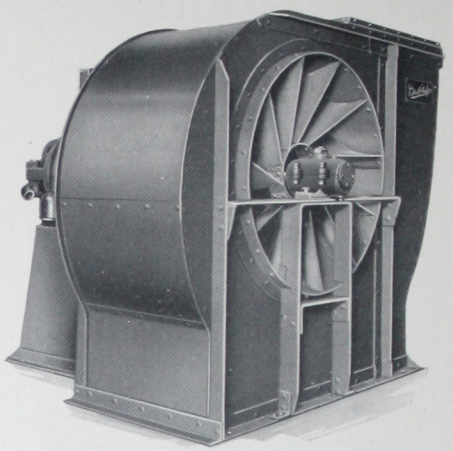


Overhung Wheel Type—Sizes 6½–13
Arrangement No. 1

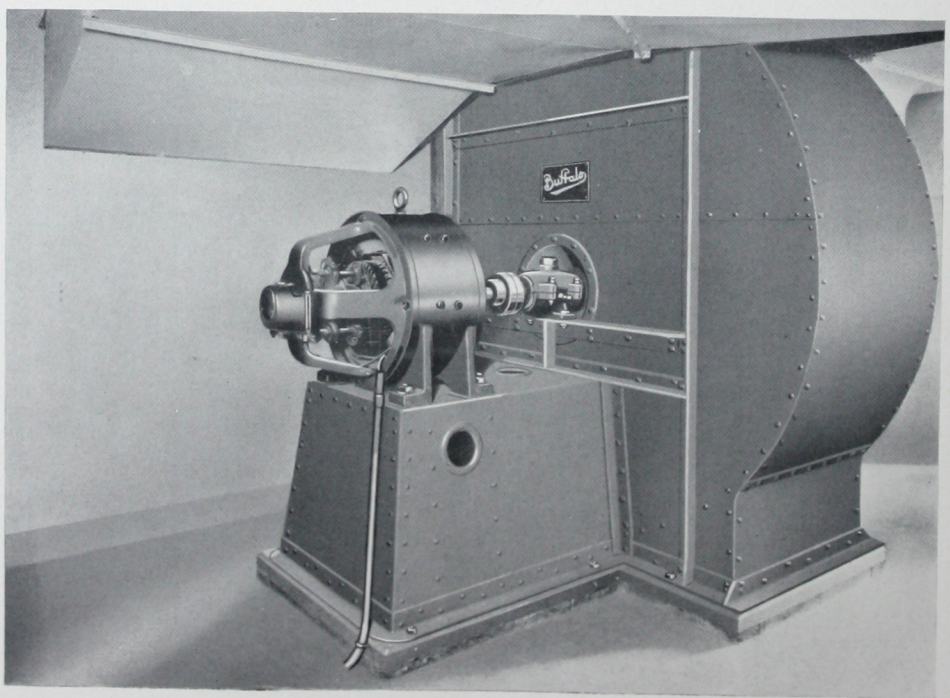
Inlet Guards

These are a series of curved vanes built into the fan inlet cone and are so arranged as to turn the entering air into the wheel with the least possible resistance. At the outer diameter they curve the air in the direction of wheel rotation, causing it to enter the wheel with a velocity approaching that of the blade itself. The angle of curvature becomes less near the shaft, at which point the air enters axially and flows out along the curved line of the fan hub. Thus the action of the guard is to create the condition of a forced vortex, reducing the loss at entrance, throttling the overload capacity and horsepower and increasing the overall efficiency. The pressure curve is made somewhat steeper and the horsepower curve flatter, necessitating operation at slightly higher speeds for same air and pressure.

Inlet guards may be used on either of the double-curved blade fans. While they are most effective upon the ~~Turbo~~ Conoidal fan they may also be used to very good advantage upon the ~~Duplex~~. Note that the use of inlet guards offers the equivalent of a complete new line of fans operating at different speeds, thus making it simpler to select a direct connected fan for motor speeds. This is of especial importance on constant speed A. C. applications.



Fan with Guards



Ventilating Fan in Federal Reserve Bank, Cleveland

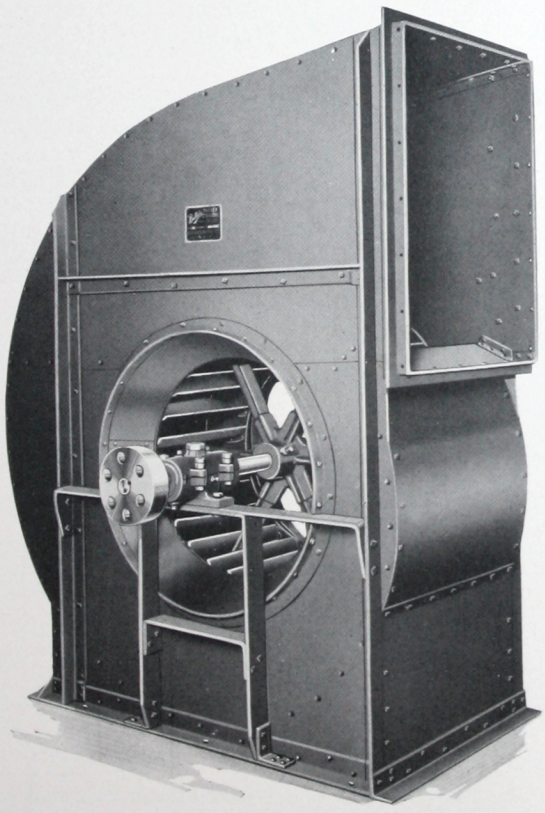
Double-Width Fans

The double-width fan has the same general proportions as the single fan except that it is twice as wide and has twice the capacity. In the ventilating fan two single-width wheels are used. In the stoker and induced draft type the two wheels are each of single width but are constructed upon the same center plate.

Where head-room must be limited the double-width fan offers a solution to meet the large capacities usually required. Owing to its stable type of pressure curve no fear need exist as to satisfactory operation of the individual wheels in parallel.

The double-width fan offers advantages in ventilating work since the wider outlet enables simple connections to be made to the usual ducts.

While the cost is somewhat higher than a single-width fan of equal capacity, a higher speed motor may be used. For the same outlet velocity, capacity, static pressure and tip speed the double-width fan will operate at about 40 per cent. higher speed than the larger size single-width fan. This means a smaller, less expensive motor, although the power required will be approximately the same in either case.



Single Width, Double Inlet Fan

Single-Width Double-Inlet Housings

Where especially high pressures are desired, accompanied by high efficiency, the Duplex Design 2 type of fan may be obtained. This is a single-width fan with two inlets. Owing to deeper blade construction this fan will operate under higher pressures for the same rotative speeds. It is a more expensive fan than the standard Duplex, owing to its extra cost of construction; but where head-room is not limited this type of fan may be used and, due to shorter bearing centers, is frequently used for induced draft work.

Standard Arrangements

Several arrangements of housing and drive are available for ~~Turbo~~ and ~~Duplex~~ fans. These are best shown by the accompanying outline of arrangements and the various illustrations. For moderate pressures, such as used in heating and ventilating work, the fan bearings are usually mounted directly on the fan or sub-base. For the higher speeds and pressures the bearings are usually mounted on independent pedestals.

The direction of rotation will be designated clockwise or counter-clockwise if the direction of wheel rotation is clockwise or counter-clockwise, respectively, when facing the driving side of the fan. The driving side of the fan will be understood to be the side opposite the inlet of a single-width fan.

Arr. 1—For Belt Drive. Single fan. Wheel overhung. Includes housing, wheel, shaft, two bearings, pedestal and pulley.

Arr. 2—For Belt Drive. Sizes Nos. 2-6 inclusive. Single fan. Pulley overhung. Includes housing, wheel, shaft, tripod bearing and pulley.

Arr. 3—For Belt Drive. Single fan. Pulley overhung. Includes housing, wheel, shaft, two bearings and pulley.

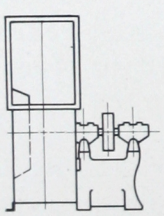
Arr. 4—For Direct Connection. Single fan. Includes housing, wheel and base. Wheel is overhung on engine or motor shaft.

Arr. 5—For Direct Connection. Single fan. Includes housing, wheel, shaft, bearing on drive side of fan, flanged coupling and base.

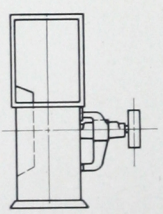
Arr. 6—For Direct Connection. Single fan. Includes housing, wheel, shaft, bearing in fan inlet, flanged coupling and base.

Arr. 7—For Direct Connection. Single fan. Includes housing, wheel, shaft, two bearings, flexible coupling and base.

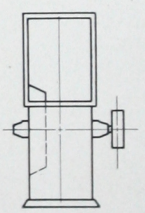
Arr. 8—For Direct Connection. Single fan. Includes housing, wheel, shaft, two bearings, flexible coupling and base.



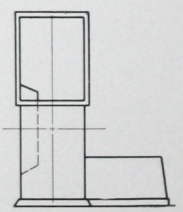
Arr. 1



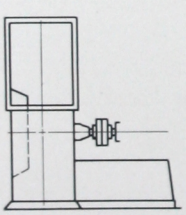
Arr. 2



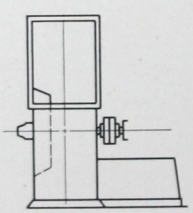
Arr. 3



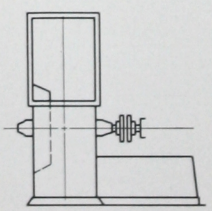
Arr. 4



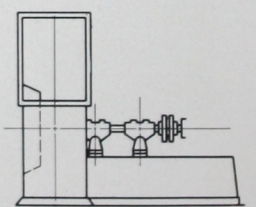
Arr. 5



Arr. 6

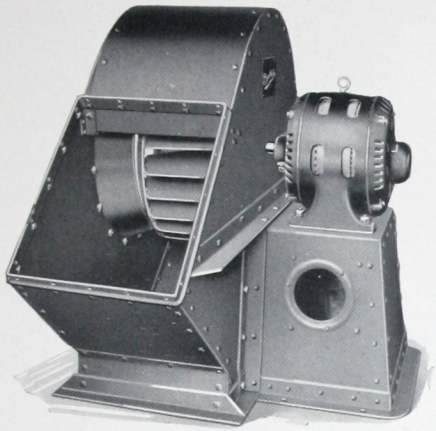


Arr. 7



Arr. 8

Special Housings



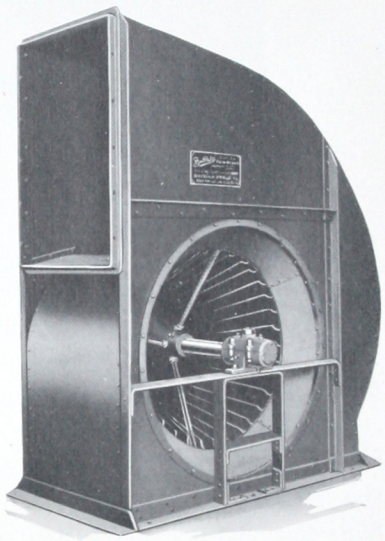
Clockwise Bottom Angular Up Discharge Fan
Arrangement No. 4

Occasionally standard types of fans will not meet the requirements of a particular installation. In general, the shapes of scroll and discharge are not altered but only the minor details. The angular discharge fan is the most common type to come under this heading.

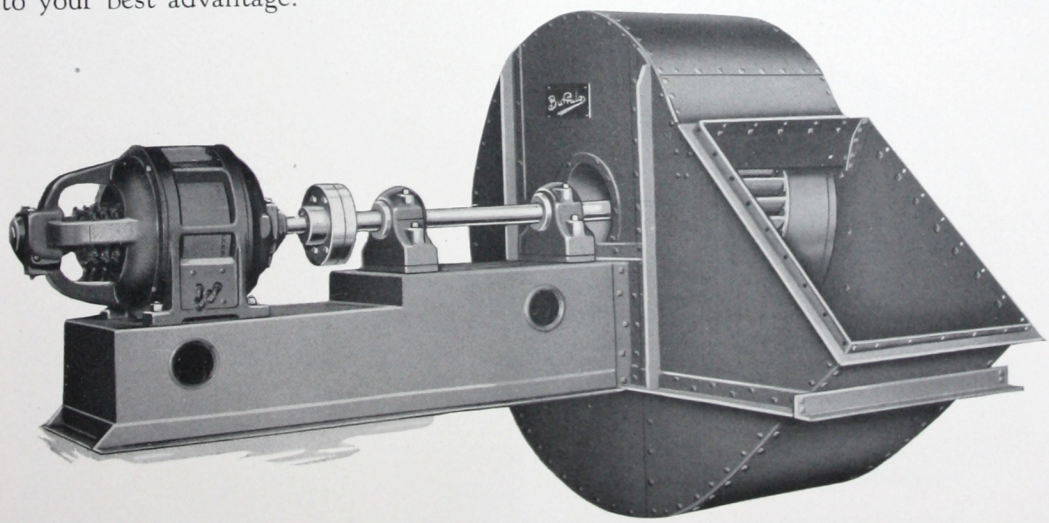
Although the three-quarter housed fan can be obtained in standard arrangements it may be advisable also for certain fans with angular outlets.

Another and more common departure is the use of full housed fans set to three-quarter type of mounting. This arrangement permits of erection with lower shafts and sub-bases.

Other modifications consist in providing special built-in features such as inlet connections or boxes, diverging outlets, outlet dampers, etc. For any such special arrangements as may be desired our engineering department is ever ready to co-operate with you to your best advantage.

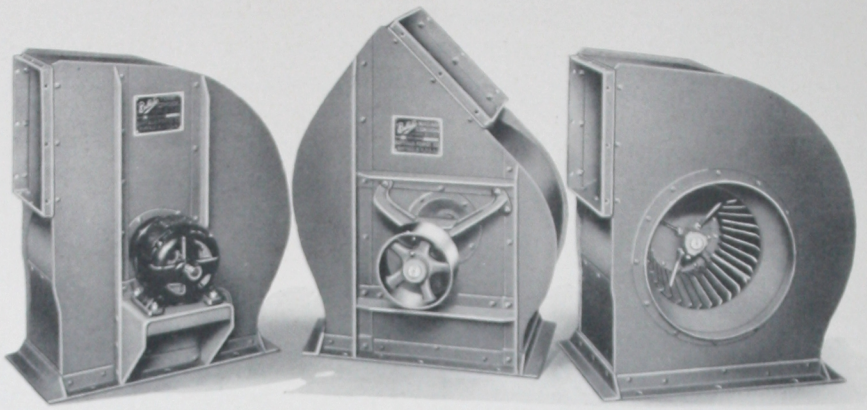


Clockwise Top Horizontal Fan
¾ Type Housing



Turbo Conoidal Fan, Full Housing Set Three-Quarters
Arrangement No. 8, with Roller Bearings

Small Ventilating Units

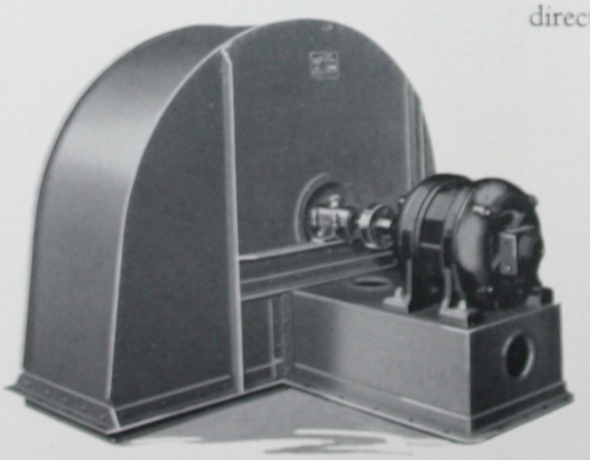


Arrangement No. 4 Arrangement No. 2

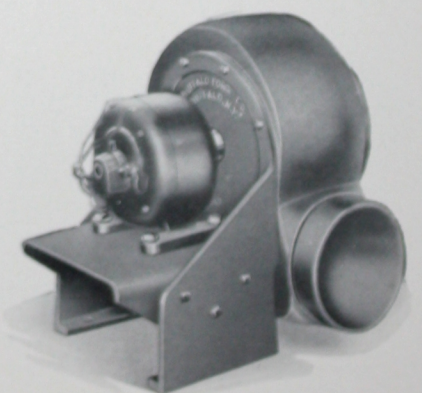
Rivetless Housings

In the smaller sized ventilating fans (Nos. 2 to 6) Duplex housings are built with a rivetless type of scroll construction. This leaves the inside surface perfectly smooth for air flow and avoids the clumsy use of steel angles in a small housing The joint thus made is air tight and, together with the smooth inside surface, retains the high efficiencies of the larger sizes. The smaller housings and wheels are regularly carried in stock so that either pulley or motor driven fans may be obtained quickly. The motor driven unit has the fan wheel overhung on the motor shaft, as illustrated. In the pulley driven fan both bearings are aligned in the same tripod casting, insuring a free running shaft and wheel at all times.

Duplex and Turbo Conoidal wheels are now available for use in the Baby Conoidal cast-iron type of housing. A separate bulletin, No. 475, covers this type of direct motor driven unit.



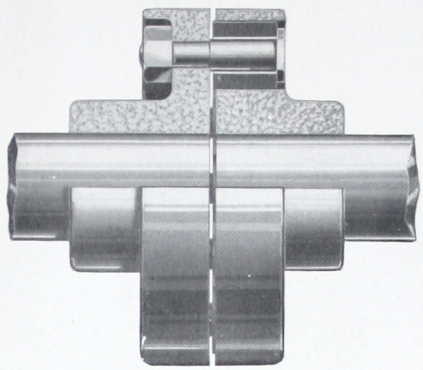
Counter Clockwise, Down Blast
Arrangement No. 7



Baby Conoidal Cast Iron Housing
Duplex or Turbo Wheel

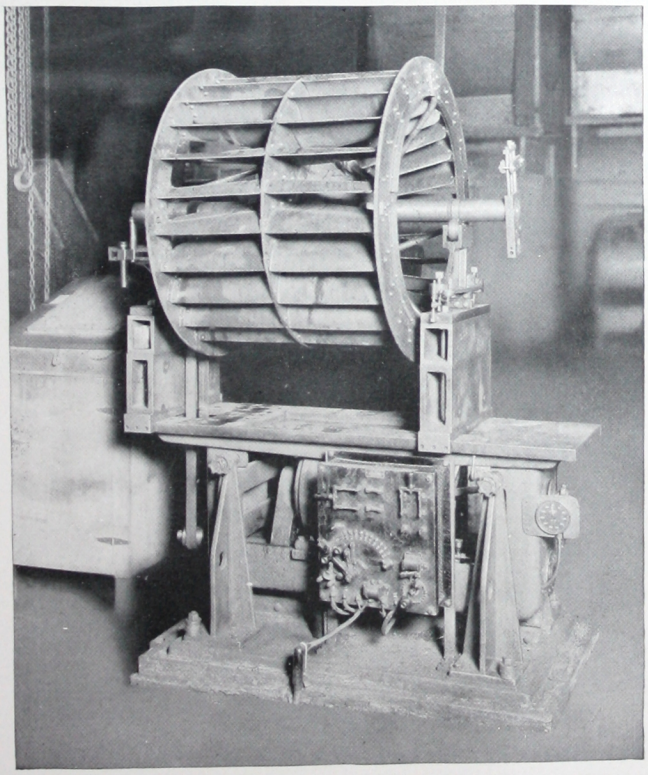
Shafts

Buffalo fan shafts are as carefully constructed as possible. Made from the best machinery steel, Duplex and Turbo Conoidal fan shafts are turned, keywayed and ground to size. The result is a shaft in perfect alignment. This fact materially aids in furthering quiet, vibrationless operation. All shafts are of ample size in wheel and bearings.



Buffalo Flexible Coupling

Buffalo Flexible couplings are regularly used on all shafts direct connected to motors. These are of the rubber-bushed pin type coupling. They have been found to be both simple and dependable, at the same time allowing a minimum amount of noise to be communicated through the coupling. The rubber bushings are themselves brass bushed to provide a more durable and flexible coupling.



Balancing Machine

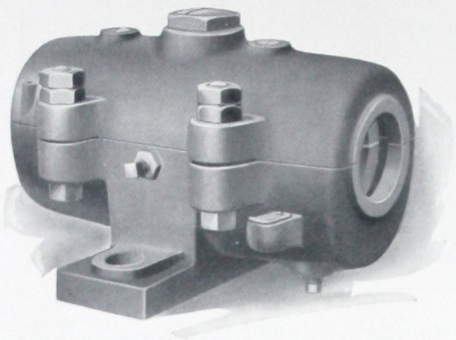
Balance

A quiet running fan must be in balance. To insure the smoothest operation, Buffalo Conoidal fans are given both static and dynamic balances on special machines constructed for this purpose. This is an added protection against noise, vibration and bearing troubles.

Moreover, owing to the very rigid type of blade and wheel construction of double-curved blade fans, wheels once balanced will not readily distort and be thrown out of balance again.

Bearing Details

Buffalo standard fan bearings are of the self-aligning, ring-oiled babbitted type. The split inner sleeves are held between



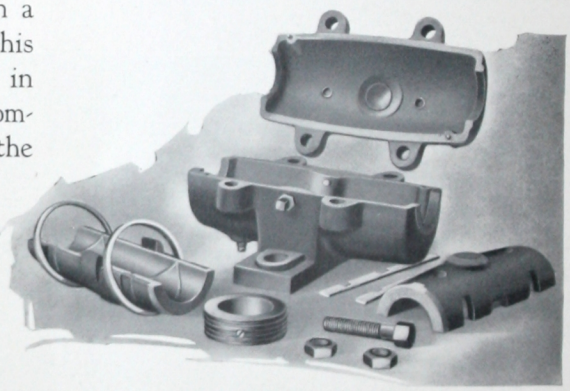
Buffalo Standard Fan Bearing

spherical surfaces, thus allowing full angular freedom. The whole is enclosed in a large dust-proof, oil-tight outer shell. This provides also an ample oil reservoir in which the two oil rings dip. By completely enclosing the thrust collar the thrust face receives constant lubrication and acts as an oil slinger as well. Overfilling of the bearing is prevented by the location of the oil filling hole, which hole serves also to indicate the oil level. At each end of the housing felt rings are supplied. These are positively secured to the outer shell and cannot turn with the shaft. They not only serve to exclude dust, but also prevent creeping of oil along the shaft.

For overhung wheel arrangements the P.M.X. type of bearing is employed. This is a heavy duty ring-oiled babbitt lined bearing with external self-aligning feature. It offers a close support at both ends for wheel and coupling.

In addition to babbitted bearings, ball and roller bearings are obtainable and are coming into more general use. Either type should provide the self-aligning feature. Single inlet exhaust fans operating at high pressures will show some end thrust which must be considered when bearings are selected. Ball and roller bearings are usually grease lubricated and require only infrequent attention.

Most of the trouble experienced in fan practice can be laid directly to inferior bearing design. Buffalo fan bearings are the result of many years experience in fan manufacture and are the best obtainable for this service.



Fan Bearing Parts

P. M. X. Type Bearing

Specifications

Furnish (and erect).....No.....multiblade fan, single (or double) width, single (or double) inlet, clockwise (or counter-clockwise) rotation.....discharge, full (or 7/8) housing. The fan shall have a capacity of.....cubic feet of air per minute at 70° F., with an outlet velocity taken at point of cut-off not to exceed.....feet per minute. The outer diameter of the wheel shall not be less than.....inches. The speed shall be sufficient to deliver the specified amount of air to all points shown on the drawings, and shall be determined by the fan manufacturer. The power to drive fan shall not exceed.....B. H. P.

The wheel shall be built of formed blades having a reverse double curvature, so designed that the air will both enter and leave the wheel without shock; the wheel to be of sufficient strength to withstand the stresses of high rotative speeds without radial plates or braces. The heel or inner edge of the blades shall have a decreasing diameter from front to back in order to maintain a uniform radial velocity through the wheel. The blades shall be supported at the back from a steel disk hot riveted to a conical cast iron hub, and connected at the inlet side by a conical flange. The wheel shall be in running balance.

The design of the fan shall be such as to give a constantly rising pressure characteristic from free delivery to complete shutoff to insure stability of operation and prevent overloading of motor.

Bearings shall be spherical, self-aligning, ring-oiled type, lined with best quality babbitt, and so designed as to allow easy adjustment for wear.

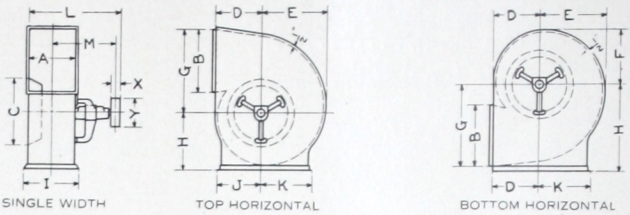
Shaft to be turned and ground after keyseating.

Outside Diameters of Duplex and Turbo Conoidal Fan Wheels

Size	2	2½	3	3½	4	4½	5	5½	6	6½	7	7½
Duplex Conoidal	12	15	18	21	24	27	30	33	36	39	42	45
Turbo Conoidal	11¼	14 1/16	16 7/8	19 11/16	22½	25 5/16	28 1/8	31	33¾	36 9/16	39 3/8	42 3/16
Size	**8**	**8½**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**18**	**20**
Duplex Conoidal	48	51	54	60	66	72	78	84	90	96	108	120
Turbo Conoidal	45	47 13/16	50 5/8	56¼	61 7/8	67½	73 1/8	78¾	84 3/8	90	101¼	112½

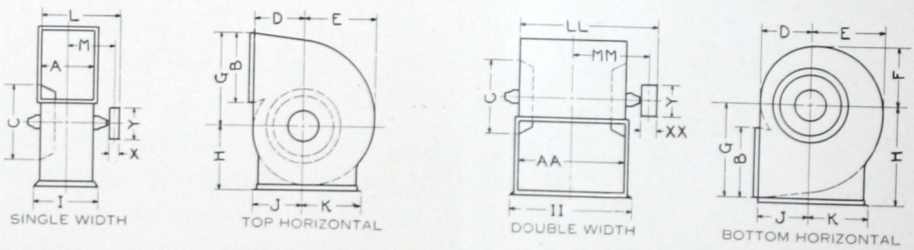
Buffalo ~~Duplex~~ and ~~Turbo~~ Conoidal Fans

General Outlines



Dimensions in Inches—(See also following page)

Size	Outlet Area Sq. Ft.	A	B	C	D	E	F	G	Top Horizontal H	Top Horizontal J	Top Horizontal K	Bottom Hor. H	Bottom Hor. K
2	.583	8	10 1/2	11 3/8	7 15/16	11 3/32	9 5/16	13 7/8	10	9 7/16	10	15	10
2 1/2	.910	10	13 1/8	14 1/4	9 15/16	13 3/4	11 9/16	17 3/8	12	11 5/16	12	18 1/2	12
3	1.31	12	15 3/4	17 1/4	11 11/16	16 3/8	13 3/4	20 13/16	14	13 3/16	14	22	14
3 1/2	1.79	14	18 3/8	20	13 1/2	19 1/16	15 15/16	24 1/4	16 1/2	15	16	25 1/2	16
4	2.33	16	21	22 3/4	15 3/8	21 11/16	18 1/8	27 3/4	18 1/2	16 7/8	18	29	18
4 1/2	2.95	18	23 5/8	25 3/4	17 1/4	24 3/8	20 3/8	31 1/4	21	18 3/4	20	32 1/2	20
5	3.64	20	26 1/4	28 1/2	19 1/4	27	22 9/16	34 11/16	23	19 3/4	22 1/4	36	22 1/4
5 1/2	4.41	22	28 7/8	31 1/2	20 15/16	29 5/8	24 3/4	38 5/16	25	21 1/2	24 1/4	39 1/2	24 1/4
6	5.25	24	31 1/2	34 1/4	22 13/16	32 5/16	27	41 5/8	27 1/2	23 1/4	26 1/4	43	26 1/4



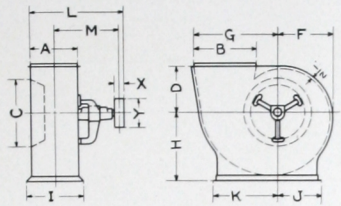
Dimensions in inches—(See also following page)

Size	Outlet Area* Sq. Ft.	A	AA	B	C	D	E	F	G	Top Horizontal H	Top Horizontal J	Top Horizontal K	Bottom Horizontal H	Bottom Horizontal J	Bottom Horizontal K
6 1/2	6.16	26	52	34 1/8	36 3/4	24 3/16	34 7/16	28 11/16	45 1/8	30	24 3/4	28 1/2	45 3/8	24 3/16	28 1/2
7	7.14	28	56	36 3/4	39 3/4	26	37 1/8	30 7/8	48 5/16	32	27	30 1/2	50 5/8	26	30 1/2
7 1/2	8.20	30	60	39 5/8	42 1/2	27 7/8	39 3/4	33 1/8	52	34	27 3/4	32 1/2	56 3/4	27 7/8	32 1/2
8	9.33	32	64	42	45 1/2	29 3/4	42 3/8	35 5/16	55 1/2	36 1/2	29 1/4	34 1/2	56 3/4	29 3/4	34 1/2
8 1/2	10.53	34	68	44 5/8	48	31 5/8	45 1/16	37 1/2	59	41	31 1/4	37	60 3/4	31 5/8	37
9	11.81	36	72	47 1/4	51 1/4	33 1/2	47 11/16	39 3/4	62 5/16	41	32 3/4	39	64	33 1/2	39
10	14.58	40	80	52 1/2	56 3/4	37 3/16	53	44 1/8	69 3/8	45 1/4	35 3/4	43	70 3/4	37 3/16	43
11	17.64	44	88	57 3/4	62 1/2	40 15/16	58 5/16	48 1/2	76 5/16	50 1/8	38 7/8	47	78	40 15/16	47
12	21.00	48	96	63	68	44 5/8	63 5/8	52 15/16	83 1/4	54 3/4	42 3/8	51	85	44 5/8	51
13	24.65	52	104	68 1/4	73 1/2	48 5/8	68 7/8	57 5/8	90 3/16	59	45 3/8	55	92	48 3/4	55
14	28.68	56	112	73 1/2	79	52 1/16	74 5/16	61 3/4	97 1/8	63	47 7/8	59 1/2	99	52 1/16	59 1/2
15	32.80	60	120	78 3/4	84 3/4	55 3/4	79 1/2	66 5/16	104 1/16	67 1/2	52 3/8	64	106	55 3/4	64
16	37.32	64	128	84	90 1/4	59 1/2	84 3/4	70 5/8	111	72	55 3/8	68	112 1/2	59 1/2	68
18	47.24	72	144	94 1/2	101 1/2	66 15/16	95 3/8	79 7/16	124 7/8	80 1/2	61 3/8	76	126 1/2	66 15/16	76
20	58.32	80	160	105	112 3/4	74 3/8	106	88 1/4	138 3/4	89 1/2	68 3/8	85	140 1/2	74 3/8	85

*Outlet Area for Single Width Fan

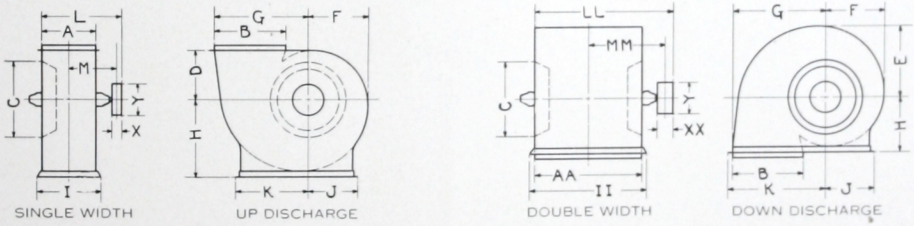
Buffalo ~~Duplex~~ and ~~Turbo~~ Conoidal Fans

General Outlines



Dimensions in Inches—(See also preceding page)

Size	Up Discharge			Down Discharge			I	L	M	X	Y	Size of Shaft
	H	J	K	H	J	K						
2	12	9	12	9	9	16	12 1/4	19 7/8	14 1/2	2 1/2	6	1 3/16
2 1/2	14 1/2	11 1/4	14 1/2	10 1/2	11 1/4	19 1/2	14 1/4	21 7/8	15 1/2	2 1/2	6	1 3/16
3	17	13 1/4	17	12	13 1/4	22 15/16	16 1/4	25 7/8	18	3 1/2	8	1 7/16
3 1/2	19 1/2	15	19 1/2	14	15	26 3/8	18 1/4	27 7/8	19	3 1/2	9	1 7/16
4	22 1/2	17	22	16	17	29 7/8	20 1/4	32 5/8	22 3/4	3 1/2	10	1 15/16
4 1/2	25	18 3/4	24 1/2	18	18 3/4	33 3/8	22 1/4	34 5/8	23 3/4	3 1/2	11	1 15/16
5	27 1/2	19 3/4	27 1/4	20	19 3/4	37 1/16	24 1/2	36 5/8	24 3/4	3 1/2	12	1 15/16
5 1/2	30	21 1/2	29 3/4	21 1/2	21 1/2	40 9/16	26 1/2	39 5/8	26 1/2	3 1/2	14	2 3/16
6	33	23 1/4	32 1/4	23 1/2	23 1/4	44	28 1/2	42 3/8	28	4 1/2	16	2 3/16



Dimensions in Inches—(See also preceding page)

Size	Up Discharge			Down Discharge			I	II	L	LL	M	MM	X	XX	Y
	H	J	K	H	J	K									
6 1/2	35 1/8	24 3/4	35	27	24 3/4	47 3/4	31 1/4	57 1/4	38 1/4	67 1/4	24	38	4 1/2	6 1/2	16
7	38 1/2	27	37 1/2	27	27	51 5/16	33 1/4	61 1/4	42 1/4	72 1/4	25 1/2	40	5 1/2	8 1/2	18
7 1/2	40 1/4	27 3/4	40	30	27 3/4	54 5/8	35 1/4	65 1/4	44 1/4	76 3/4	26 1/2	42 1/2	5 1/2	8 1/2	18
8	44	29 1/4	42 1/2	32	29 1/4	58 1/8	37 1/4	69 1/4	48 1/4	82 1/2	29	45 1/2	6 1/2	10	20
8 1/2	49	31 1/4	45 1/2	34 3/4	31 1/4	62 1/8	40 1/4	74 1/4	50 1/4	87 1/2	30	48 1/2	6 1/2	10	20
9	49	32 3/4	48	34 3/4	32 3/4	65 9/16	42 1/4	78 1/4	54 1/4	92 1/2	32	51	8 1/2	11	24
10	54	35 3/4	53	38 1/2	35 3/4	72 1/2	46 1/4	86 1/4	58 1/4	101 1/2	34	55	8 1/2	13	26
11	59 1/2	38 7/8	58	42	38 7/8	79 7/16	50 1/4	94 1/4	64 1/4	114	38	62	8 1/2	16	28
12	65 1/2	42 3/8	63	46	42 3/8	86 3/8	54 1/4	102 1/4	70		41	68	10		30
13	70	45 3/8	68	49 1/2	45 3/8	93 5/16	58 1/4	110 1/4	74 1/2		43	72	11		34
14	75 1/2	47 7/8	73 1/2	53	47 7/8	100 3/4	63 1/4	119 1/4	82 1/2		48	78	13		36
15	80 1/2	52 3/8	79	57	52 3/8	108 5/16	68 1/4	128 1/4	87 1/2		50	83	15		38
16	86	55 3/8	84	60 1/2	55 3/8	115 5/16	72 3/8	136 3/8			54	88 1/2			40
18	96 1/2	61 3/8	94	68	61 3/8	129 1/16	80 3/8	152 3/8			61	96			46
20	107	68 3/8	105	75 1/2	68 3/8	143 15/16	90 3/8	170 3/8			63 1/2	104 1/2			50